



## Original Article

# Comparison of Transabdominal and Transvaginal Sonography in Follicular Monitoring

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### Abstract

Transabdominal sonography (TAS) and Transvaginal sonography (TVS) were compared for follicular monitoring in 62 patients of infertility. These patients were referred for follicular monitoring in normal and stimulated cycles from infertility clinic. Patients' compliance and acceptance was excellent for TVS technique as compared to TAS technique. The overall resolution of ovarian and follicular anatomy was much better in TVS. With TAS only 25.5% had good visualization of follicles as compared to 84.8% ( $p < 0.05$ ) in TVS. TVS offered advantage of much better detection rate of smaller follicles ( $< 10$  mm) and higher accuracy in assessing number of follicles.

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### Introduction

Ultrasound plays a very crucial role in cycle monitoring of spontaneous or stimulated cycles. There includes:-Evaluation of the endometrial reaction, evaluation of changes in the cervical canal, evaluation of the follicular growth, determination of ovulation, Evaluation of the luteal phase, determination of hyper stimulation. Ultrasound is unique in its ability to documents the morphologic changes in the ovary and uterus during normal and induced cycles<sup>1,2</sup>. Hackeloer<sup>3</sup> in 1978, was the first to demonstrate with ultrasound the sequential events of ovary in the normal menstrual cycle. Transvaginal sonography (TVS) quickly gained acceptance among radiologists and obstetricians. Several investigators demonstrated that improved visualization of follicular structure is possible with Transvaginal (TV) scanning than Transabdominal scanning (TA) in majority of

patients<sup>7-9</sup>. The present study was designed to compare the usefulness of Transabdominal sonography (TAS) and Transvaginal sonography (TVS) in follicular monitoring in patients in infertility. It is well established that diagnostic and therapeutic ultrasound is now indispensable in the investigation and management of infertility.

### Material and Methods

An eight month prospective study was conducted during the period of Jul 2008 to Feb 2009, to compare the usefulness of TAS and TVS in the follicular monitoring in Rajshahi Medical College Hospital at infertility Clinic. The ultrasound scan was performed at a private center. TA scanning always preceded TV scanning and in any given case the same Sonologist interpreted both the scan. TVS has dramatically advanced the ability of the Sonologist to evaluate the monitoring gynecologic

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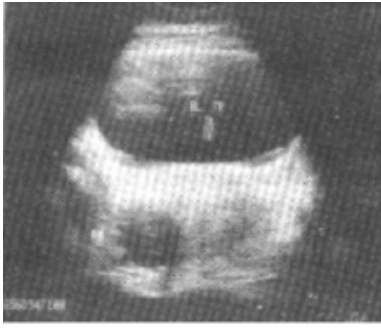
infertility patients. Undoubtedly, the greatest advantage of endovaginal probes is the ability to use high frequency (7.5 MHz) probe, adjacent to the origin of study and thereby superior resolutions can be obtained. The distance between the tip of the transducer placed at the anterior abdominal wall and the pelvic organs is almost twice to the distance between the tip of the transducer applied at the vaginal vault and the pelvic organs. All the patients had distended urinary bladder during TAS but TVS scanning done empty bladder. After taking the Ta all patients voided completely before the TV scanning. TVS was done in the same sitting immediately after TAS. The TVS probe was sheathed with a condom containing coupling gel. TVS was performed in patients in supine position and knees flexed. At the end of the study patients were asked if she had any discomfort during examination and give the choice of TA or TVS technique. Majority of the patients' choice TVS scan. 2% patients felt discomfort TVS scan but Sonologist can good visualized follicle in TVS than TAS scan. In TA scan poor visualized ovaries and follicles.

## Results

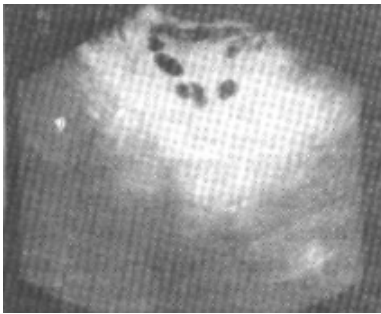
A total of sixty two patients were studied. Patients' tolerance and acceptance for TVS was excellent. None of our patients reported to be severe uncomfortable with TVS. Initial apprehension and hesitancy was noted in 15 (24.19 %) cases regarding TVS. That was easily overcome by proper explanation about the procedure and its better result. Two (3.22%) patients had excessive apprehension leading to vaginismus at the attempt of introduction of TV probe. Both these patients were middle socio economic status. They were allowed to witness another patients being examined without any discomfort. This help in relieving of apprehension and we succeeded in TV scanning in both these patients. In TVS majority (85%) of patients expressed some discomfort with full bladder technique and at least 15(24.19%) patients described full bladder TAS as a painful procedure. Some patients (25% approx) had under distended bladder. Some others (approx12%) had over

distended bladder, making it difficult to examine. These patients had to void urine partially, which is itself is very discomforting. Some of these patients had to be rescheduled for the next day. In a busy department like ours, it was very difficult to synchronize the timing schedule for each and every patient. However we instructed the patients to report to us whenever they felt full bladder. During TVS scanning 10(16.12%) patients experienced pain while introducing TV probe, which later on was found to be related to vaginitis due to infection. 14 patients reported mild discomfort while maneuvering the TV probe at the extremes of the fornices to locate deep seated ovaries. This was related to excessive stretching of the vaginal vault. The resolution of the ovaries and follicles was excellent with TVS (Figs.1 and 2) with TA approach only 8 had good visualization of follicles 48 had poor visualization. Ovaries and follicles could not be identified in 4 patients with TAS. Whereas, with TVS 55 patients (88.7 %) had good visualization of follicles 5 had poor visualization of follicles, (Fig.3). One ovary could not be located in one (1.16 %) patients and both ovaries could not be located in another patient (1.16 %). Both these cases were found to have extensive omental adhesions and the ovaries were placed quite high up in the pelvis.

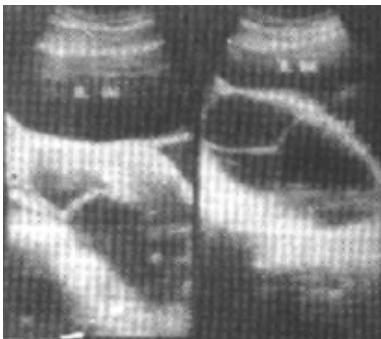
Besides resolution of the follicles, we also examined the relationship between the follicular size and detection rates of follicles by both the scanning methods. For follicles > 18 mm in size, no significant difference was noted in detection rate (55 vs 60) between TAS and TVS. However, in smaller follicles especially below 10 mm the TVS offered definite improvement in the detection rates. TVS even enabled us to detect and count follicles as small as 3-4 mm accurately. No TA scanning could identify such small follicles and in all these cases the ovaries appeared as uniformly hypoechoic structures. It is important to record the number of follicle with their respective sizes in gonadotrophin stimulated cycles. Here again the TVS detection rate of follicles far exceeded TAS detection rate. The frequency of 5 or more growing follicles were detected in 88.7% in transvaginal scanning as compared to 12.9% in transabdominal scanning.



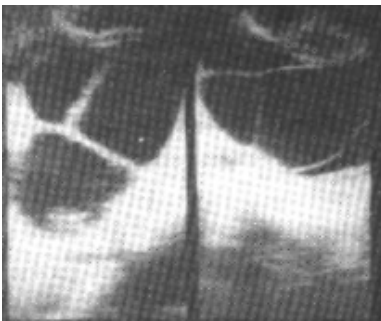
**Fig. 1a:** Transabdominal pelvic scan showing uterus and right ovary. No distinct follicles are seen in the ovary.



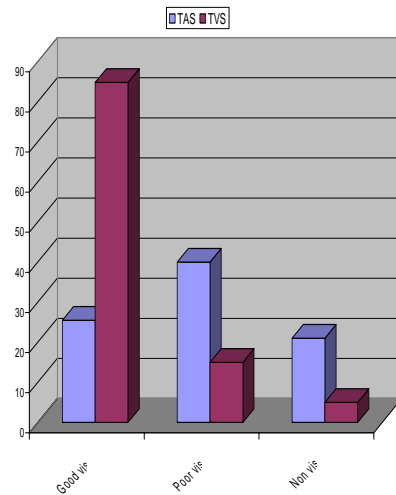
**Fig 1b:** Transvaginal scan of right ovary of same patient, same sitting. Multiple follicles are distinctly seen.



**Fig 2a:** Transabdominal pelvic scan showing uterus and both ovaries with large follicles.



**Fig 2b:** Transvaginal scan of both ovaries of same patient, same sitting showing both ovaries with large follicles.



**Fig 3:** Bar diagram showing state of comparative visualization.

### Discussion

After Hackeloer's pioneering study<sup>3</sup> of the morphological changes in ovary during normal cycles many studies have been conducted to evaluate cyclic changes in the ovaries both during normal and stimulated cycles<sup>1,2,4-6</sup>. After the introduction of TV scanning method many investigators concentrated on the accuracy of assessment of follicular dynamics<sup>7-9</sup>. A good number of studies were done later comparing transabdominal (TA) and transvaginal (TV) methods of studying the pelvic organs<sup>10-13</sup>. TVS is still to achieve momentum in Bangladesh mainly due to (i) non availability of TV probes. (ii) ignorance/reluctance of the referring physicians (iii) lack of adequate know 1- edge of TVS and altered anatomical orientation. The present study was undertaken to see patients' response/acceptability of TVS and also to compare the anatomical information available in these two modalities. To our surprise, nearly all the patients preferred the TV mode of scanning. This acceptability was probably partially biased as these patients were examined immediately after a relatively uncomfortable study with full bladder. Another reason for better patients' compliance was that all the patients were referred to us by the gynecologists at infertility clinic who already explained the necessity, simplicity and accuracy of TVS. So these patients were already psychologically primed for TVS. However, the

fact that TVS is much more comfortable cannot be denied. Another fact we admit is that, it is extremely difficult to synchronize the optimum bladder distension for TAS at the scheduled time in a busy department. So scheduling these patients was another problem although we instructed the patients to report fullness of bladder immediately. Again there is a great deal of individual difference in the perception of full bladder and need to void. Some patients have been found to be uncomfortable with as little as 150-200 ml of urine, while some other found to tolerate 700-800 ml of urine quite comfortably. For a good TAS neither under distended nor over distended bladder is desirable. The major advantages of TVS includes (i) excellent tissue characterization of the uterus and ovaries (ii) closeness of the transducer to the target organs producing high resolution sonogram especially in presence of bowel gas or obesity when TAS is very difficult (iii) rapid performance of the examination without the need for a full bladder permitting better patients scheduling (iv) high degree of patients compliance and acceptability (v) accurate serial assessment of follicular and endometrial dynamics in infertility management programs. The disadvantages of TVS are (i) initial difficulty in anatomical orientation (not a problem for experienced Sonologist) (ii) limited field of view (These days wide scanning angle transducers are available allowing wide field of view) (iii) inability to image highly placed ovaries (iv) initial hesitancy and reluctance on the part of the patients, especially in the Indian setup (easily overcome by proper counseling). It is important to document serial follicular dynamics in normal as well as stimulated cycles in the management of infertility; TV scanning helps us to do that accurately. The sonologists can accurately guide the infertility specialist for timing administration of HCG, titrating dosage of gonadotrophin administration. Detection of occurrence of ovulation helps in timing of Intra uterine insemination (IUI). Yee et al [14] demonstrated a very good correlation of number of follicles detected with TVS and laparoscopic finding. Evidences also suggest that, transabdominal methods underestimates the

number of follicles, than does TVS. TV ultrasound measurement of follicular size has lower intra and inter-observer variability<sup>12</sup>. Yee et al<sup>14</sup> and Musoles et al<sup>15</sup> have demonstrated that TV scanning methods showed a higher degree of patients compliance and acceptance of TVS has already been confirmed in our study. This highlights the need to make use of this mode of investigation for wider indications.

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